

# NASA TECH BRIEF



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## Electronic Strain-Level Counter

An electronic strain-level counter, for use on aircraft, counts and records the number of times the strain at a point in a structural member exceeds each of four preset levels.

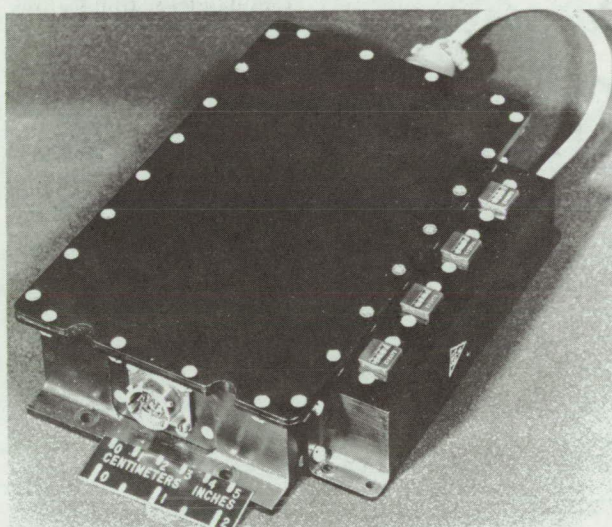


Figure 1.

For monitoring in-service strain in aircraft, current technology uses the extensometer, the mechanical scratch gage, or a continuous record of strain gage signals. The disadvantage of the extensometer is the restrictive gage length required for sensitivity; and the output formats of the scratch gage and the continuous record complicate data reduction.

The strain-level counter uses a 28 volt dc power supply, a metallic resistance strain gage bridge as the sensor, integrated and discrete solid-state circuits for signal processing, and electromechanical counters for

data storage and readout. In addition, the instrument is compatible with any variable-resistance type sensor and weighs a total of only 2.5 pounds.

The four data channels of the strain-level counter count the number of times the strain at a point in a structural member exceeds a preset adjustable level. Each channel is comprised of a level detector, a drive circuit, and a four digit electromechanical counter. The drive circuit, triggered by the level detector when the strain exceeds the preset level, produces a pulse to advance the counter. In the level detector, a dead band is provided so that, after the strain exceeds the upper limit (and a count is registered), the strain must decrease below the deadband before a subsequent increase in strain can cause another count to be registered. The deadband prevents counting small flexural oscillations around each of the preset levels. Figure 1 shows the two units of the system, and Figure 2 is a system block diagram.

The astable multivibrator serves two functions. It provides ac excitation for the strain gage bridge and it triggers the strobe pulse generator, which in turn enables each level detector during each data pulse from the ac amplifier. The bridge output is a low level pulse train with an amplitude proportional to the strain input. This signal is amplified by the ac amplifier and applied to each data channel.

### Note:

Requests for further information may be directed to:

Technology Utilization Officer  
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Reference: TSP70-10716

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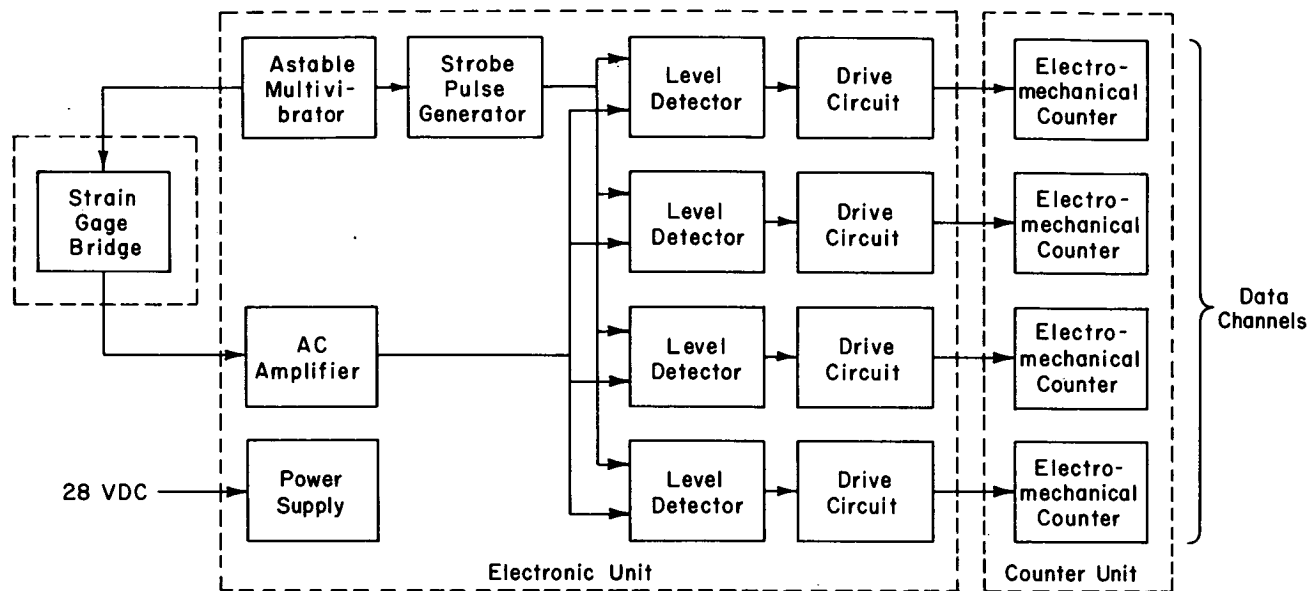


Figure 2.

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel  
Mail Code 173  
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